LAKSHYA

JEE 2.0 2026

DETERMINANTS

Mathematics | **Lecture - 01**

SACHIN JAKHAR (Sachhuu Sir)

Topics *to be covered*

1. GENERAL TALKS
2. INTRODUCTION TO DETERMINANTS
3. MINORS & Co-Factors
4. Question Practice
5.

GENERAL TALKS

Sir XI puri barbad hai, koi dikkat to nahi aayegi na! Aap basics se padhaoge na??

Kya mai abhi bhi JEE Mains & Adv. crack kr skta/skti hu, agar aaj se hi jaan lga du to ????

Class XII ke saath XI ko manage krna chahta/chahti hu! Guide us the way.

Sir iss baar XII BOARDS bhi hai to kya aap BOARDS ki tyaari bhi krwaoge??

yes!

Jee → 60% (XII) Main focus → XII.

Flow of the Class

Live Lectures

Daily Homework (H.W.)Questions – jo next class ki Starting mein discuss honge

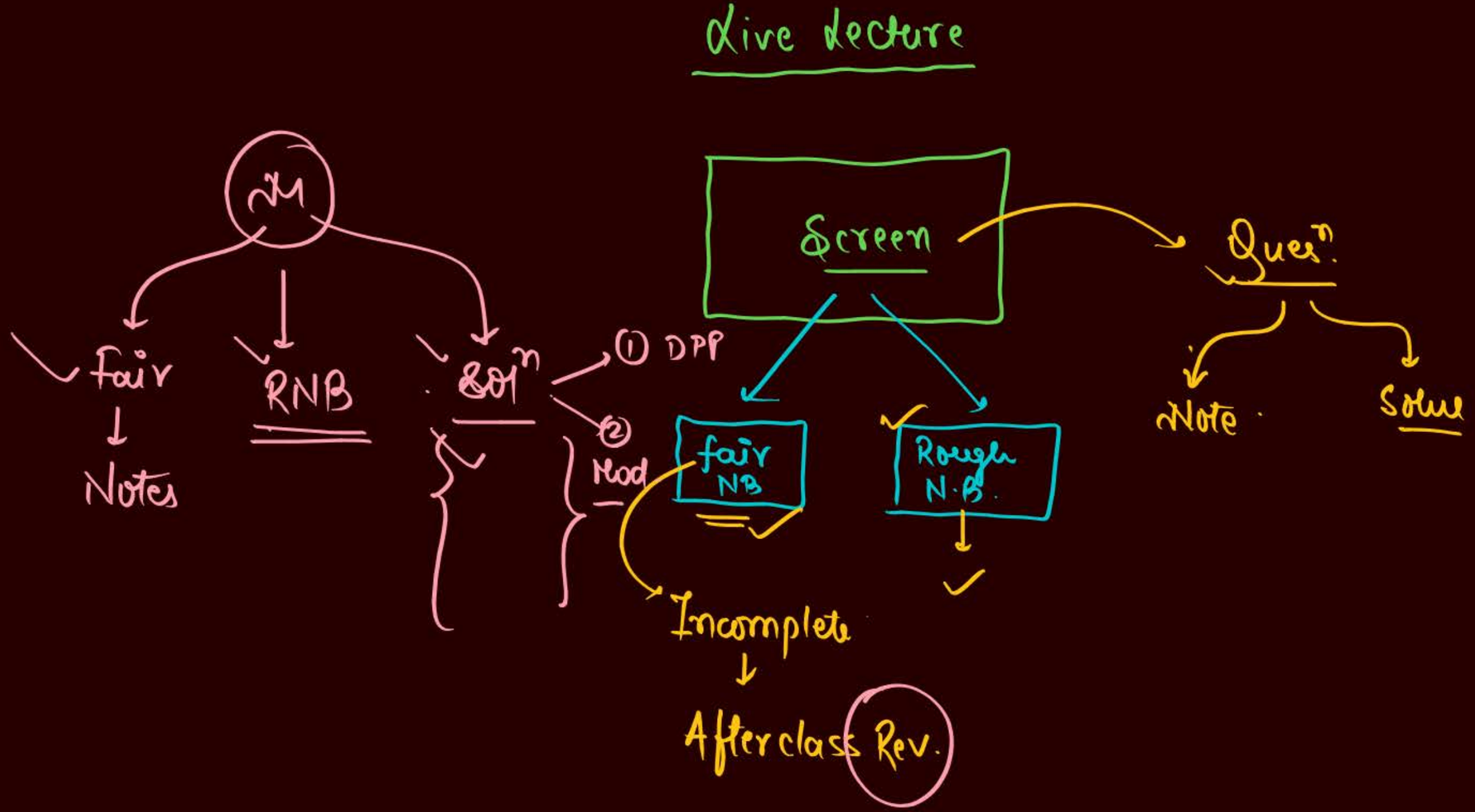
DIBY (Do It By Yourself) – Jo aapko khud solve krne hain!!

In Class : Basic & Acidic Questions, Challenger Question, Critical Thinking Questions(CTQ), PYQ's, Questions from Module, Questions from Different Sources & Books!!

Derivations & Questions Important for Boards

DPP & Module Homework

Maths is all about Question Practice, aur sawalo ki kami kabhi hone nhi dunga!!


Live lecture
Screen
Ques.
Note
Solve
fair
Notes
RNB
Sol.
① DPP
② Mod
fair NB
Rough N.B.
Incomplete
Afterclass Rev.

• Date :

12-06-2025

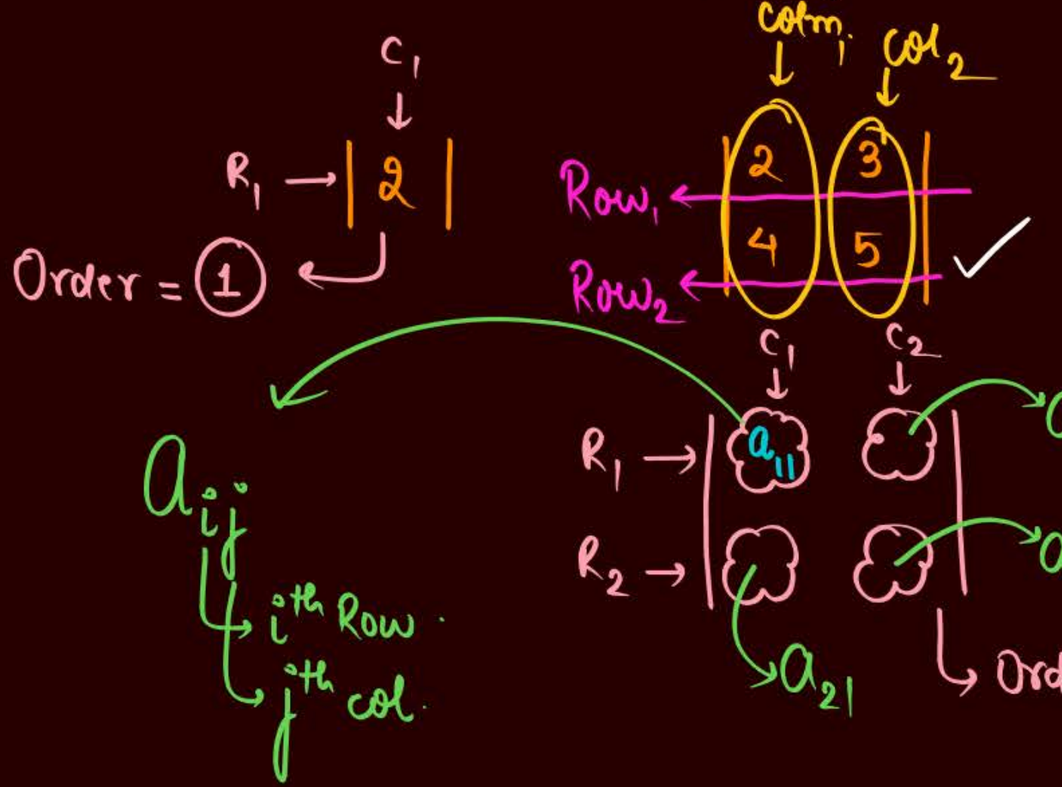
Let's Start

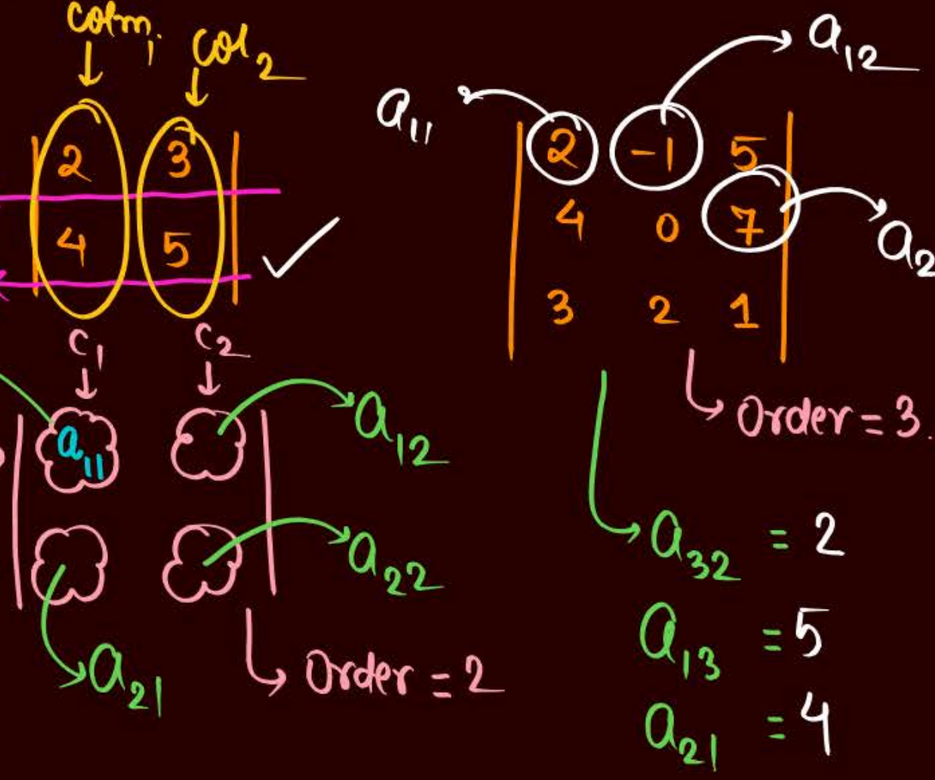
DETERMINANTS

INTRODUCTION TO DETERMINANT

Short way of Representation

determinant ≡ | |





Note :-

In det.

$\Downarrow$

no. of rows = no. of col^m

Note :-

Order of det = n = $n \times n$

$n \rightarrow$ Rows

$n \rightarrow$ colm

Value of det of Order = 2

$$-2 = (2\times5) - (3\times4) = \begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix}$$

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix}_{2\times2} = (ad) - (bc)$$

$$\# \begin{vmatrix} x^3 & -4 \\ 2 & 5 \end{vmatrix} = (5x^3) - (-4\times2)$$

$$= 5x^3 + 8$$

$$\det |-3|_{1\times1} = -3$$

$$|2|_{1\times1} = 2$$

$$\# \begin{vmatrix} 3 & -1 \\ 2 & -5 \end{vmatrix} = (-15) - (-2) = -15 + 2 = -13.$$

Sachin sir special summary (S^3)

① det → short

② no. of R = no. of C

③ order of det = n or $n \times n$ (Row = Col)

④ address = a_{ij} (i → Row का no., j → Col. का no.)

⑤ Value

$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$

Note :

Number of Rows = Number of Column.

Determinant of Order :

Two $\equiv 2 \times 2 \Rightarrow \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$

Three $\equiv 3 \times 3 \Rightarrow \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$

A Determinant of order 1 is the number itself.

Number of elements in determinant of order $n = (n)^2$.

QUESTION

Solve : $\begin{vmatrix} x^2-3 & 5 \\ -4 & 1 \end{vmatrix} + \begin{vmatrix} 5x & 3 \\ 4 & 2 \end{vmatrix} - 7x \begin{vmatrix} 8 & 3 \\ 5 & 2 \end{vmatrix} = 3.$

$\{(x^2-3) - (-20)\} + (10x - 12) - 7x(16 - 15) = 3.$

$\downarrow 1$

$x^2 - 3 + 20 + 10x - 12 - 7x = 3.$

$x^2 + 3x + 2 = 0$

$x^2 + 2x + x + 2 = 0$

$x(x+2) + 1(x+2) = 0$

$(x+2)(x+1) = 0 \rightarrow \boxed{x = -1, -2}$

"Minors"

ex:- $\begin{vmatrix} 2 & -1 \\ 3 & 5 \end{vmatrix}_{2\times 2}$

M_{11} = Minor of $(a_{11} = 2) = 5$

M_{21} = Minor of $(a_{21} = 3) = -1$

M_{12} = Minor of $(a_{12} = -1) = 3$

M_{22} = Minor of $(a_{22} = 5) = 2$

$C_{22} = (-1)^{2+2} \times 2$

$= 2$

$C_{12} = (-1)^{1+2} M_{12}$

$= -3$

* * *

$C_{ij} = (-1)^{i+j} M_{ij}$

Co-factor of element a_{ij} $= (-1)^{i+j}$ (Minor of elem. a_{ij})

$C_{11} = (-1)^{1+1} M_{11} = (-1)^2 M_{11} = 5$

$C_{21} = (-1)^{2+1} M_{21} = (-1)^3 (-1) = +1$

$$C_{ij} = (-1)^{i+j} M_{ij}$$

$C_{11} = (-1)^{1+1} M_{11}$

$C_{11} = M_{11} = -2$

$C_{22} = M_{22} = -4$

$C_{32} = -M_{32} = -11$

$C_{31} = (-1)^{3+1} \begin{vmatrix} 4 & -1 \\ -2 & 3 \end{vmatrix} = 12 - 2 = 10.$

ex:- $\begin{vmatrix} 2 & 4 & -1 \\ 5 & -2 & 3 \\ -6 & 0 & 1 \end{vmatrix}_{3\times3}$

$M_{23} = \begin{vmatrix} 2 & 4 \\ -6 & 0 \end{vmatrix} = 24$

$= 0 - (-24)$

$\# M_{11} = \begin{vmatrix} -2 & 3 \\ 0 & 1 \end{vmatrix} = (-2\times1) - (0\times3) = -2$

Minor of $(-2) = M_{22} = \begin{vmatrix} 2 & -1 \\ -6 & 1 \end{vmatrix} = 2 - (-1\times-6) = 2 - 6 = -4.$

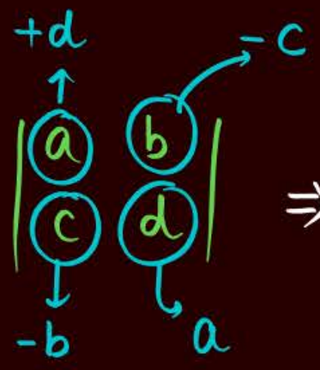
$M_{32} = \begin{vmatrix} 2 & -1 \\ 5 & 3 \end{vmatrix} = 6 - (-5) = 11$

M_{32}: 3 → Row, 2 → col.

Value of determinant = pick any row (or column)

Correspondingly multiply, each elem. of Row (or col.) with their Cofactor & add

ex:- $\begin{vmatrix} a & b \\ c & d \end{vmatrix} \Rightarrow$



$R_1 \rightarrow$ (+d, a) (-c, b)

$ad + b(-c) = \boxed{ad-bc}$

$R_2 \rightarrow$ (c, -b) (d, a)

$c(-b) + d(a) = \boxed{ad-bc}$

$C_1 \rightarrow$ (+d ← a) (-b ← c)

$ad + (-bc)$

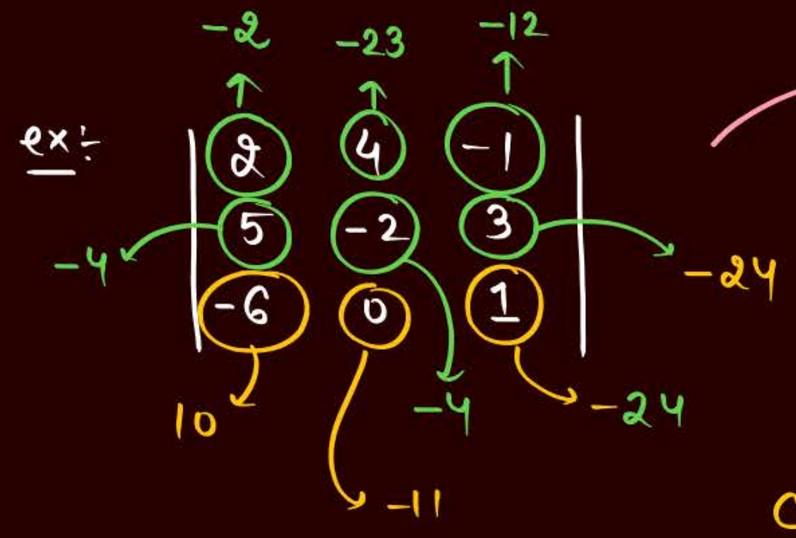
$\boxed{ad-bc}$

$C_2 \rightarrow$ ((-c) ← b) (a ← d)

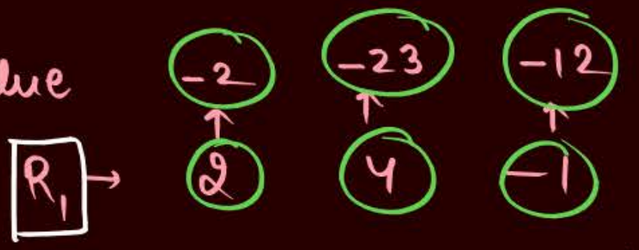
$(-bc) + (ad)$

$\boxed{ad-bc}$

(#) $\begin{vmatrix} 2 & 4 & -1 \\ 5 & -2 & 3 \\ -6 & 0 & 1 \end{vmatrix} = -84.$



Value



$= (-4) + (-92) + (12)$

$= \boxed{-84}$

$R_3 \rightarrow$ (-6) (0) (1)

10 -11 -24

$= -60 + 0 - 24$

$= -84.$

C_2

$-23 \leftarrow 4 \quad = -92$

$-4 \leftarrow -2 \quad = +8$

$-11 \leftarrow 0 \quad = 0$

$\boxed{-84}$

C_3

$-1 \rightarrow -12 \quad = 12$

$3 \rightarrow -24 \quad = -72$

$1 \rightarrow -24 \quad = -24$

-84

Homework

Relax & Revise !!

It is never about End Result
It's always about the Journey

#future IITians